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Dyeing or washing installation for narrow textile fabric and method of removing an excess amount of colorant or detergent

The invention firstly relates to a dyeing or washing installation for narrow textile fabric, the narrow fabric being passed through a dyeing or washing liquor, followed by removal of the excess amount.

In the case of dyeing installations for narrow textile fabrics, such as padding devices, it is known to provide pressing rollers, known as padding rollers, which act mechanically, pneumatically or else hydraulically on the narrow textile fabric, so that the dye liquor is pressed into the narrow fabric by squeezing and, as this happens, a removal of the excess amount takes place at the same time. Similar devices are also known in the case of washing installations for narrow textile fabrics in which pressing rollers remove excess washing liquor. In particular in the case of dyeing installations, uneven application of dye takes place when the narrow fabric is squeezed in this way, in particular in the region of the longitudinal side edges of the narrow fabric. The guiding of the narrow fabric through the liquor may in this case take place by means of deflecting rollers or conveyor belts.

With regard to the prior art described above, a series of technical problems for the invention is seen in further developing a dyeing or washing installation of the type in question advantageously with regard to the application of dye and the removal of excess amounts.

This series of problems is solved firstly and substantially by the subject-matter of Claim 1, based on the idea that the narrow fabric is guided along a width-adapted suction nozzle, disposed downstream of the dyeing or washing liquor. This configuration firstly produces an improved, even application of dye

to the narrow fabric. In addition, there is improved removal of excess amounts of dyeing or washing liquor. It is preferred for the suction nozzle to be adapted to the width of the narrow fabric, so that uniform suction removal takes place over the entire width of the fabric. In particular, when the suction nozzle is disposed downstream of a dyeing installation, a uniform application of dye in the region of the longitudinal bordering edges of the narrow fabric can be obtained. It is preferred for the suction removal to take place by means of a pre-adjustable vacuum pump. As mentioned, vacuum suction removal of this type, by means of a suction nozzle, may be disposed downstream of a padding machine. In addition, it is also conceivable for it to be disposed at the outlet of a steamer and of a washing basin. The advantage of vacuum suction removal is better dye penetration in the narrow fabric and an improved possibility for cleaning, and as a result greater fastness. Furthermore, if a suction nozzle according to the invention is disposed on a padding machine, reduced consumption of dye can be obtained. If a drier is provided directly downstream of a washing installation for narrow textile fabrics, provision of a suction nozzle according to the invention in between produces the advantageous effect that less power in comparison with the conventional methods is necessary in the region of the drier, since the suction removal from the narrow textile fabric conducted through the washing installation results in less residual moisture than in the case of the conventional squeezing method. It proves to be particularly advantageous for the negative pressure at the outlet of the suction nozzle to be measured and kept constant at a preset value. Furthermore, in the case of a dyeing or washing installation in which the narrow fabric is passed through the dyeing or washing liquor in a number of passes, it is provided that the removal of the excess amount takes place between two passes of the narrow fabric through the dyeing or

washing liquor. It is preferred in this case that the narrow fabric is guided along a suction nozzle after each pass. In a further development of the subject-matter of the invention, it is provided that the suction removal is carried out at right angles to the direction of movement of the narrow fabric. Furthermore, it proves to be advantageous that the width of the suction nozzle can be set according to the width of the narrow fabric in question. The suction removal according to the invention is conceivable on the one hand for inelastic narrow fabric. In addition, it is also possible for the narrow fabric to consist of elastic material. To counteract irregular dyeing of such material caused by stretching of the elastic fabrics, it is provided that the narrow fabric is guided along the suction nozzle by means of a screen belt. This screen belt serves in the region of the suction nozzle as a support, it being preferred for motor-driven circulating endless screen belts to be provided. Furthermore, it is proposed for the suction removal to take place in the upward and/or downward direction. This configuration allows suction removal to be carried out on one side and on both sides of the narrow textile fabric, it also being possible for the suction nozzle to be disposed vertically and horizontally. In addition, a design in which the suction removal takes place at an inclination with respect to the narrow fabric is also conceivable. In the case of suction removal from both sides of elastic narrow fabric, it is further preferred for a screen belt to be associated with each suction nozzle, a circulating endless screen belt being preferred, so that the narrow fabric is prevented from stretching both on the upper side and on the underside by means of the screen belt. Moreover, there is the possibility of squeezing taking place upstream of suction removal, so that, for example downstream of a liquor application tank, the narrow fabric is firstly squeezed in a known way and subsequently guided along a suction nozzle,

producing a uniform distribution of the dye particles within the fabric. A configuration in which suction removal is carried out from a plurality of narrow fabrics parallel to one another proves to be particularly advantageous. In this case, a width-adapted suction nozzle may be associated with each narrow fabric, on one or both sides. However, it is also conceivable to dispose a suction nozzle extending over the entire width on one or both sides of the parallel-running narrow fabrics, covering or directing units being provided between the individual fabrics, on the one hand serving as guidance for the fabric and on the other hand confining the suction effect exclusively to the individual fabrics, so that controlled suction removal from the individual fabrics is obtained even in their side edge regions. To reuse excess amounts of dyeing or washing liquor, it is provided that the liquid removed by suction is passed through a water separator and fed back into the dyeing or washing liquor. Furthermore, the narrow fabric may undergo suction removal while running out straight. In addition, the suction removal may also take place through a plurality of layers of the narrow fabric. In an advantageous way, it is provided here that the suction removal from the narrow fabric is carried out while it runs through spirally, to provide a further increase in dye penetration and dye uniformity and also fastness effects. In this respect, it is proposed that the narrow fabric be guided spirally while stretched out on two guiding rollers which are spaced apart from each other, for the narrow fabric to pass a number of times through the dyeing or washing liquor. According to the invention, it is proposed for the suction removal to be simultaneously applied to fabric strands produced by the spiral guidance. The suction nozzle is accordingly not adapted to the individual narrow fabric width. Rather, the suction nozzle width corresponds to the entire widthwise extent of the fabric strands within the spiral guidance.

The invention also relates to a method of removing an excess amount of colorant or detergent from a narrow textile fabric which is conducted through a dyeing or washing liquor in a dyeing or washing installation. To provide a method which is improved advantageously with regard to the removal of excess amounts, it is provided that the narrow fabric is guided along a width-adapted suction nozzle, disposed downstream of the dyeing or washing liquor. This method according to the invention firstly produces an improved, even application of dye to the narrow fabric. In addition, there is improved removal of excess amounts of dyeing or washing liquor, it being preferred for the suction nozzle to be adapted to the width of the narrow fabric, so that uniform suction removal takes place over the entire width of the narrow fabric. In this respect, it is further proposed for the narrow fabric to be passed a number of times in succession through the dyeing or washing liquor and subjected to suction removal by means of the suction nozzle to remove the excess amount. With the narrow fabric running through the dyeing or washing liquor spirally in this way, suction removal of the excess amount takes place after each pass through the dyeing or washing liquor, which, in particular in a dyeing installation, leads to an increase in dye penetration and dye uniformity.

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The invention is explained in more detail below with reference to the attached drawing, which merely represents a number of exemplary embodiments and in which:

Figure 1 shows a schematic representation of a dyeing installation for narrow textile fabric with a downstream suction removal device;

Figure 2 shows a perspective representation of a suction nozzle with narrow fabric guided along it;

Figure 3 shows a schematic representation of a second embodiment with a plurality of narrow fabrics running parallel to one another, which are acted upon by a common suction nozzle;

Figure 4 shows a schematic representation of a further embodiment for suction removal from elastic narrow fabric;

Figure 5 shows a representation corresponding to Figure 1, but concerning a further embodiment;

Figure 6 shows a schematic representation of a suction removal device with the narrow fabric running through spirally, in side view;

Figure 7 shows the schematic front view relating to Figure 6.

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A dyeing installation 1 for a narrow textile fabric 2 is represented and described, initially with respect to Figure 1.

It is preferred for the said narrow textile fabric to be conducted through the installation in a continuous process, the narrow fabric 2 firstly being immersed through a dyeing band 3 - a padding machine - and then, if appropriate, passed on for further treatment. The running-through direction is indicated in Figure 1 by the arrow r.

According to the invention, provided downstream of the dyeing installation 1 in the running-through direction is a suction removal device 4, along which the narrow

textile fabric 2 is guided after running around deflecting rollers 5 associated with the dyeing installation 1.

In the exemplary embodiment represented, the suction removal device 4 has on the underside of a narrow textile fabric 2 a suction nozzle 6, the width of the open nozzle mouth 7, measured transversely with respect to the running-through direction r, being adapted to the width of the narrow fabric 2 to undergo suction removal (cf. Figure 2). In this case, the suction nozzle 6 or its nozzle mouth 7 may have a fixed width. A nozzle width which can be adapted to the width of the narrow fabric by adjustment is also conceivable, however.

The suction removal takes place at right angles to the direction of movement r of the narrow fabric 2, the suction nozzle 6 being positioned in the exemplary embodiment represented underneath the narrow fabric 2, between two rollers 8 supporting the narrow fabric 2. Alternatively, suction removal from the narrow fabric 2 may also take place from the upper side (see dash-dotted representation in Figure 1). Furthermore, a combined upper and lower suction removal may also be provided, it being preferred in the case of such a configuration for the suction nozzles 6 to be disposed offset in relation to one another in the running-through direction r, to prevent one influencing the other in terms of the suction power.

The suction removal takes place by means of a presettable vacuum pump 9, the negative pressure being measured at the outlet of the suction nozzle 6, i.e. in the region of the nozzle mouth 7, allowing this preset negative pressure to be kept constant.

Moreover, a separator 10 is provided, by means of which entrained liquid - here dyeing liquor - can be

separated out from the air sucked in and can be fed back to the dyeing bath 3 via a pump 11.

In the case in which it is associated with a dyeing installation 1, the way in which a suction removal device 4 is disposed according to the invention ensures an even application of dye to the narrow fabric 2, in particular in the region of the longitudinal bordering edges 12 of the narrow fabric 2. Furthermore, this produces improved dye penetration in the narrow fabric 2 and also an improved possibility for cleaning and, resulting from this, greater fastness effects. Moreover, a lower consumption of dye can be advantageously obtained.

With the suction removal device 4 disposed downstream of a washing installation, the advantageous effect is obtained that less power is necessary for drying the narrow fabric 2, as a result of the lower residual moisture.

Figure 3 shows in a further embodiment a schematic representation of a detail of a device for suction removal from a plurality of narrow fabrics 2 running parallel to one another. In the exemplary embodiment represented, a suction nozzle 6 extending over the entire width of the narrow fabrics 2 is provided on the underside of the three fabrics 2 running parallel to one another, covering units 13 laterally guiding the said fabrics being provided between the individual fabrics 2. The said covering units have the effect at the same time of confining the suction effect exclusively to the individual fabrics 2.

As shown, here it is also possible for a suction nozzle 6 to be provided both on the underside and on the upper side of the narrow fabric 2, and in addition on both sides too (see dash-dotted representation in Figure 3).

To counteract stretching of elastic narrow fabric 2, which would lead to irregular dyeing effects, a circulating endless screen belt 14 is provided according to the further exemplary embodiment represented in Figure 4, the said belt being motor-driven and transporting the narrow elastic fabric 2 over the suction nozzle 6. The suction removal takes place in this case directly underneath the portion of the belt 14 supporting the narrow fabric 2.

In a way corresponding to the exemplary embodiments described above, it is similarly alternatively possible here for suction removal to take place on the upper side and additionally on both sides too, here again a screen belt 14 associated with the upper suction nozzle 6 being provided for stabilizing the narrow fabric 2 (cf. dash-dotted representation in Figure 4).

As a further alternative, according to Figure 5, squeezing of the narrow fabric 2 may take place upstream of suction removal, pressing rollers 15 being provided for this purpose in the customary way in the region of the dyeing installation 1. This combined treatment of the narrow fabric 2 also contributes to the uniform distribution of the dye particles within the fabric.

The narrow fabric 2 may undergo suction removal while running out straight. In addition, however, this may also be performed while it is running spirally, which is schematically represented in Figures 6 and 7. This further increases the dye penetration and dye uniformity and also the fastness effects, it being possible for suction removal from the narrow fabric to take place through a plurality of layers of the narrow fabric 2 if it runs through spirally.

For the spiral running of the narrow fabric 2 through a dyeing band 3 or else a washing bath, the narrow fabric

2 is stretched and guided on two deflecting rollers 20, 21 spaced apart from each other, the spiral guidance producing a plurality of fabric strands. The removal of the excess amount takes place in this case between two passes of the narrow fabric 2 through the dyeing bath 3, a suction nozzle 6 being provided in the exemplary embodiment represented, the fabric strands produced by the spiral guidance being simultaneously acted upon and subjected to suction removal by the said nozzle. Consequently, the narrow fabric is passed a number of times in succession through the dyeing liquor (or washing liquor) and subjected to suction removal by means of the suction nozzle 6 for removal of the excess amount.

With the narrow fabric 2 running through spirally in such a way, it is also possible for suction removal to take place on both sides of the said fabric, for which purpose a second suction nozzle 6, offset in height with respect to the first nozzle and represented in the drawings by dash-dotted lines, is provided on the inner side of the fabric strands.

In this exemplary embodiment, the width of the suction nozzle 6 is adapted approximately to the width of the deflecting rollers 20, 21 around which the narrow fabric 2 passes in a spiral manner.

This configuration produces increased dye penetration and dye uniformity of the narrow fabric 2.

All features disclosed are (in themselves) pertinent to the invention. The disclosure contained in the associated/attached priority documents (copy of the prior application) is hereby fully incorporated in the disclosure of the application, including for the purpose of incorporating features of these documents in claims of the present application.

